A recommendation system for customer's preferences using interaction

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***Abstract*: Improve the understanding of customers in the shopping behavior is the most important task. It is easy to understand customer's ideas using online shopping behavior but still using offline shopping behavior lacks some facilities as compare with online shopping behavior. Mining the customer's ideas and their preferences is the main motivation of the shopping behavior**.

***Index Terms*: Customer preference, interaction behavior, store-type recommendation, physical stores.**

I. INTRODUCTION

Most important thing is using their area of interest, we can calculate their most wanted preferences. As customers are aware that, they are interested in new upcoming products with extra attracted features which is also available in the market. Using feedback system or previous history record we can predict the exact area of interest of the customers related to shopping. People minds is always changes as per the new upcoming ideas and infrastructure so to mining their preferences is itself a big task or a challenge. Researchers are developing the most ranking products for the recommendation of others. Customer mostly go with online shopping behavior but if he wants to feel that product physically then he goes with the offline shopping i.e. physical stores or retailer stores. There are many feature of extraction uses in offline shopping behavior.

II. REVIEW OF LITERATURE

Bagheri, et al. [1] presented the recent popular ideas which is helpful in the shopping behavior of the customers. Using supervised and unsupervised algorithm it is helpful in the good communication between the customer and manager. Cai et al. [2] proposed how exactly the theoretical model will get work related to the shopping behavior. And also how to identify the customer preferences and intrinsic preferences using time and probability factors. Fang, et al. [3] proposed the mobile recommendation system. In that using mobile device we can calculated the customers time related to every product that he puts his interest. We know customer are interested in online shopping behavior rather than offline Galati et al. [4] Studied the contact information which is built in the device and which is people will carry while shopping. Using routing algorithm, it is helpful to find out the information of interaction behavior of the customer. Web access also gives many facilities related to this.

V. Jackson et al. [5] proposed the two- dimensional concept which is helpful to capture the customer information related to visiting and non-visiting stores. If the trust and good communication between customer and shop manager is good, then process will get executed fast.S. Lee et al. [6] Proposed the information of shopping behavior in particular shop using their interaction of customer trace and extract the customer information. When any customer is interested to purchase any product they he will find out the related records of it.

D. Lemire et al. [7] proposed collaborative filtering using rating base system. Using this system, we can rate any product and using rating any further customer will get understand the product records and review of that product. D. Lian et al. [8] proposed the location recommendation system which played very important role in the shopping behavior. It is depending upon the customer choices using Wi-Fi based recommendation also we can have calculated customer current location in the map. WLAN helpful to trace the location of customer

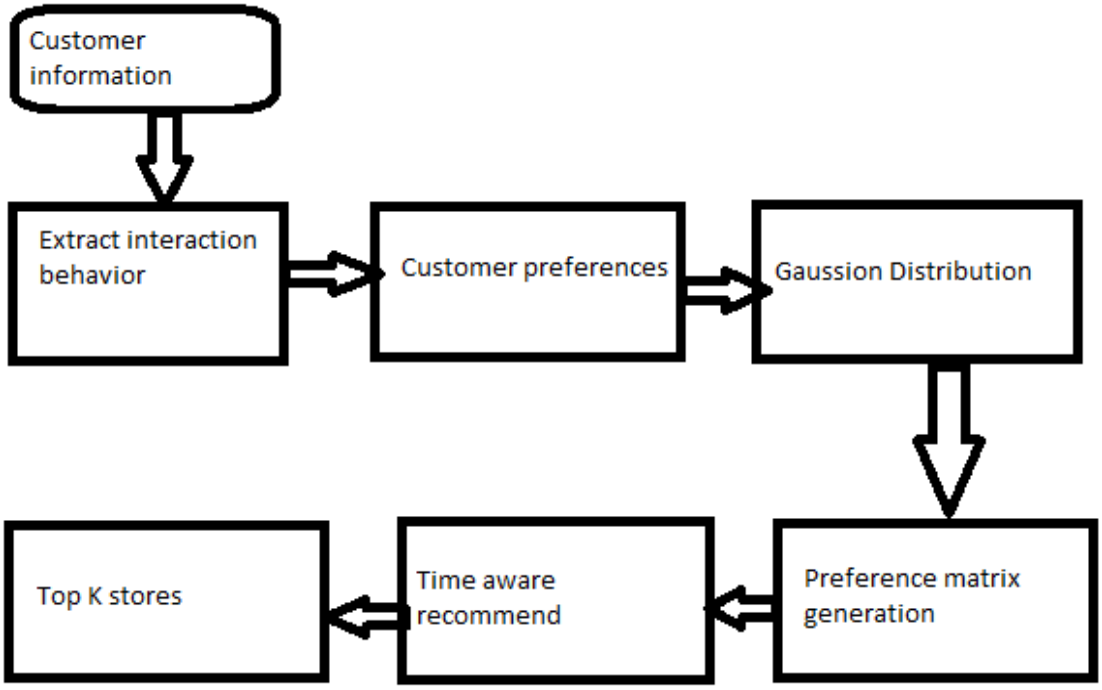
M. C. Popa et al. [9] studied the problems comes in the shopping behavior related to time location also some time there is server problem while doing online shopping. Using online shopping there is also security problem. So to overcome such problems multi-level architecture will get used M. Radhakrishnan et al. [10] studied sensors data information to captured the activities of the customers in the shopping behavior. Every customer's activity time like his entering time in the shop then how much he will spend in front of any product that he wants to purchase his leaving time etc.

R. Xiang et al. [11] presented the binary relationship for detecting the network solution. It also provides the relationship information of every customer with other one, it also improves the classification performance.M. Ye et.al [12] proposed collaborative filtering approach for shopping system. It provides the larger scale services for the customer in the shopping behavior but for that the relation is important while shopping otherwise it will not applicable. Chen et al. [13] proposed the fingerprint method for the map detection. It's a graphically represented. So for that they will use the Wi-Fi using received signal strength that is RSS. RSS build the fingerprint map. Wi-Fi stores the data information of every customer.

Zhang et al. [14] they presented the cross location collaborative algorithm for the use of Point of interest i.e. POI. It will provide customers current location and it is very much important in the online shopping and also in the offline shopping behavior. Zheng

et al. [15] proposed how system is based upon the social networking how it will use in major and also using customer's comments section with their information. GPS uses very much over here. Facebook is the most liking example related to the social networks. It also maintains the security.

III. SYSTEM OVERVIEW



As shown in the fig; the system is design in such way that we well known about online shopping behavior bust this system is built for offline shopping behavior. When customer's information will get extracted using their interaction behavior then we can have calculated every customer's preferences using the probability. Using Gaussian distribution, we can have calculated the probability in between two customers with the multiple parameters. And also Gaussian distribution divides the results using standard deviation and it denotes like N (0,1). It summarized the probability structure. Using generation of the preference matrix we can see how many customers are interested to visit and do shopping in any particular shop. For that matrix will get generated. Time aware recommendation is based upon time factor of very customers spending time in the shop and using that we can calculate the Top-K store recommendation so this two factor are depended with each other.

IV. RESULTS

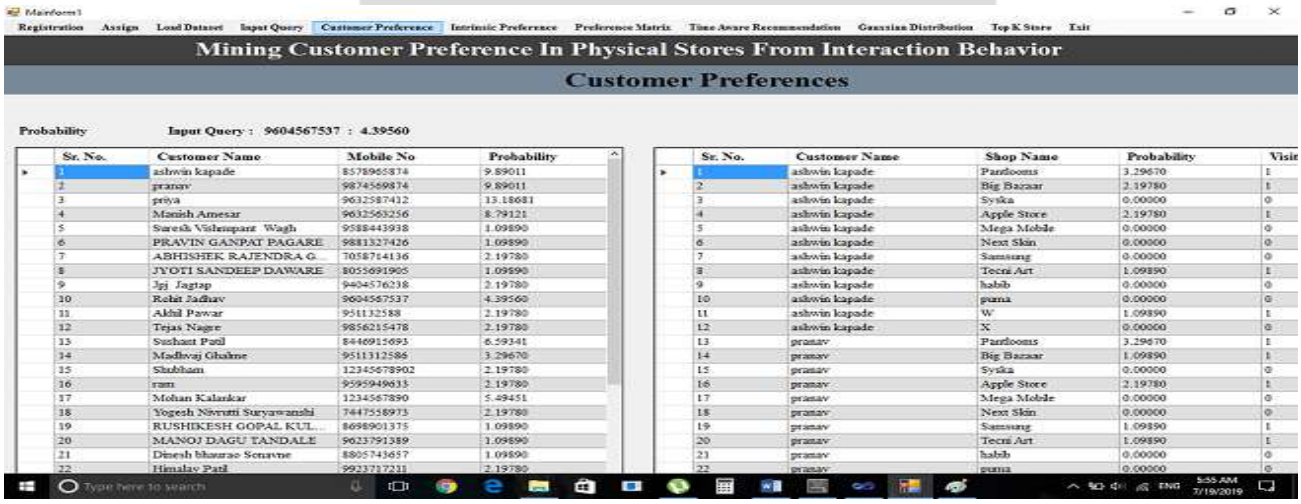
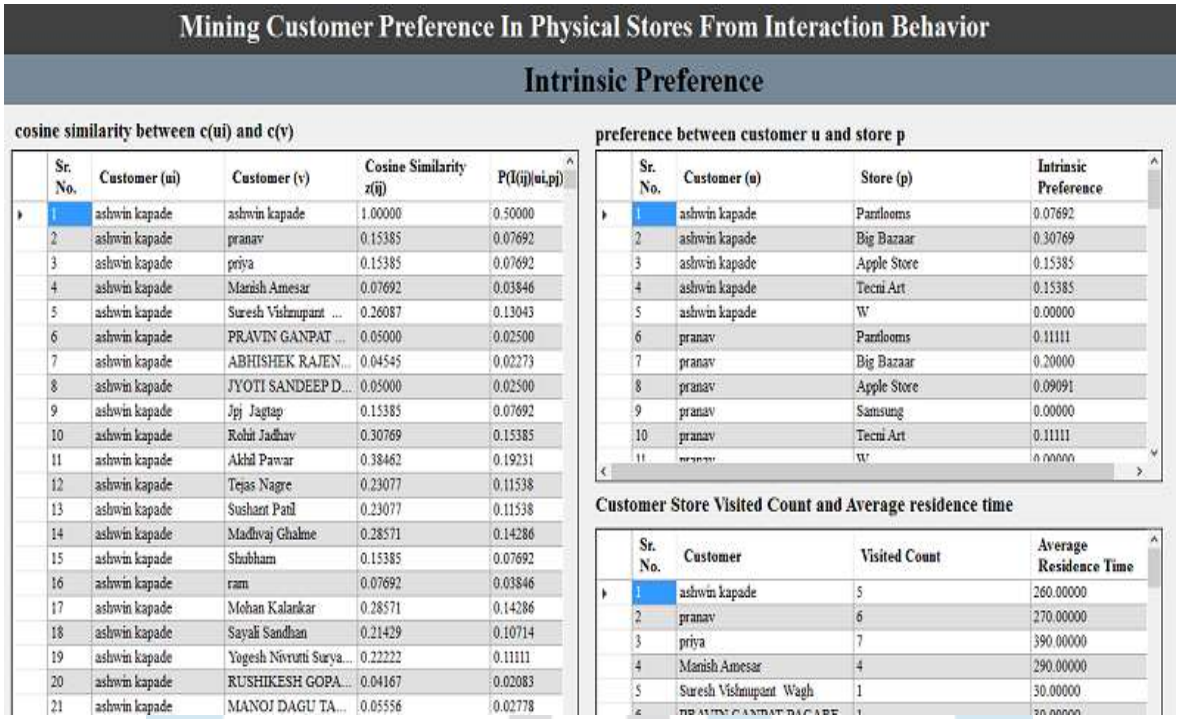


Fig A: Customer Preference:

When any customer will go for shopping obliviously he visits multiple shops so using customer preferences we can calculate the customer's probability. Means how many times one customer visited any shop and using that we can calculated his probability and also count the total probability of particular shop. E.g. if I visit bigbazzar, so to calculate my probability in that shop and also there

are many other customers will visit that shop so also calculate the total probability of that shop. Every customer has their unique entries with the help of their mobile number.



Sr. No.	Customer (ui)	Customer (v)	Cosine Similarity z(ij)	P(I(ij)|ui,pj)
1	ashwin kapade	ashwin kapade	1.00000	0.50000
2	ashwin kapade	pranav	0.15385	0.07692
3	ashwin kapade	priya	0.15385	0.07692
4	ashwin kapade	Manish Amesar	0.07692	0.03846
5	ashwin kapade	Suresh Vishnupant ...	0.26087	0.13043
6	ashwin kapade	PRAVIN GANPAT ...	0.05000	0.02500
7	ashwin kapade	ABHISHEK RAJEN...	0.04545	0.02273
8	ashwin kapade	JYOTI SANDEEP D...	0.05000	0.02500
9	ashwin kapade	Jpj Jagtap	0.15385	0.07692
10	ashwin kapade	Rohit Jadhav	0.30769	0.15385
11	ashwin kapade	Akhil Pawar	0.38462	0.19231
12	ashwin kapade	Tejas Nagre	0.23077	0.11538
13	ashwin kapade	Sushant Patil	0.23077	0.11538
14	ashwin kapade	Madhvaj Ghalme	0.28571	0.14286
15	ashwin kapade	Shubham	0.15385	0.07692
16	ashwin kapade	ram	0.07692	0.03846
17	ashwin kapade	Mohan Kalankar	0.28571	0.14286
18	ashwin kapade	Sayali Sandhan	0.21429	0.10714
19	ashwin kapade	Yogesh Nivrutti Surya...	0.22222	0.11111
20	ashwin kapade	RUSHIKESH GOPA...	0.04167	0.02083
21	ashwin kapade	MANOJ DAGU TA...	0.05556	0.02778

Sr. No.	Customer (u)	Store (p)	Intrinsic Preference
1	ashwin kapade	Panrlooms	0.07692
2	ashwin kapade	Big Bazaar	0.30769
3	ashwin kapade	Apple Store	0.15385
4	ashwin kapade	Tecni Art	0.15385
5	ashwin kapade	W	0.00000
6	pranav	Panrlooms	0.11111
7	pranav	Big Bazaar	0.20000
8	pranav	Apple Store	0.09091
9	pranav	Samsung	0.00000
10	pranav	Tecni Art	0.11111

Sr. No.	Customer	Visited Count	Average Residence Time
1	ashwin kapade	5	260.00000
2	pranav	6	270.00000
3	priya	7	390.00000
4	Manish Amesar	4	290.00000
5	Suresh Vishnupant Wagh	1	30.00000

Fig B: Intrinsic preference:

In intrinsic preference we calculate the cosine similarity between two customers. Here cosine similarity of customer with respect to himself is always 1. And also calculate total time of visits of customer in a shop. And also calculate the average residence time of customer. E.g. when I entered in shop and using my time factor i.e. my spending time in that shop we calculate the probability of my time w.r.t. other customer in that shop is different but my time w.r.t. myself is always 1. And using that calculate the total visiting count of the customer in the shop and using that calculate total residence time of that shop using probability.

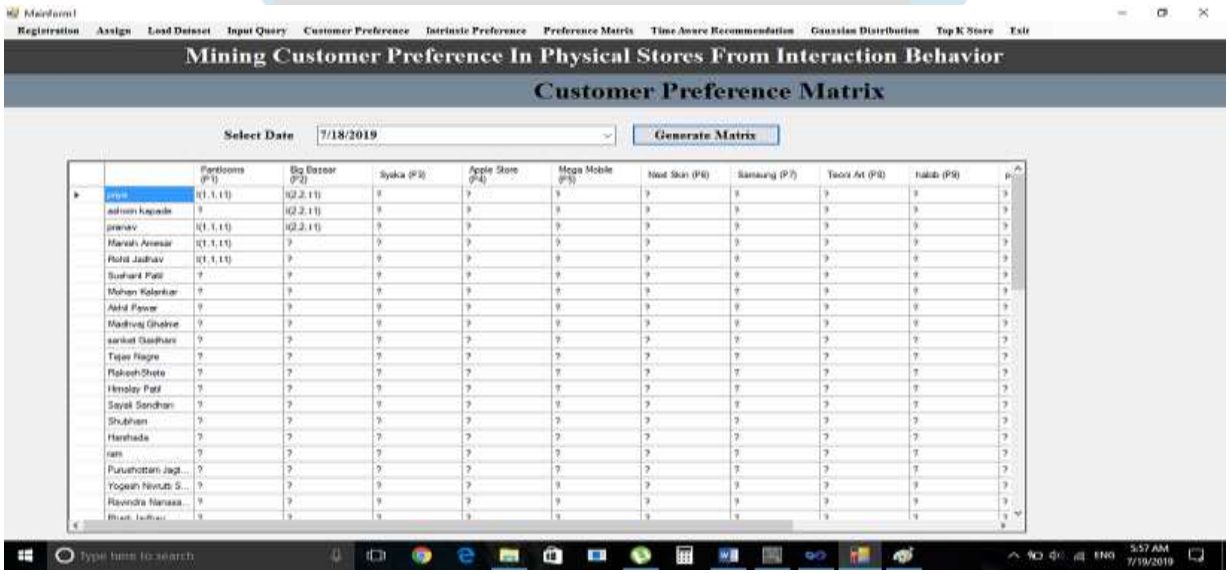


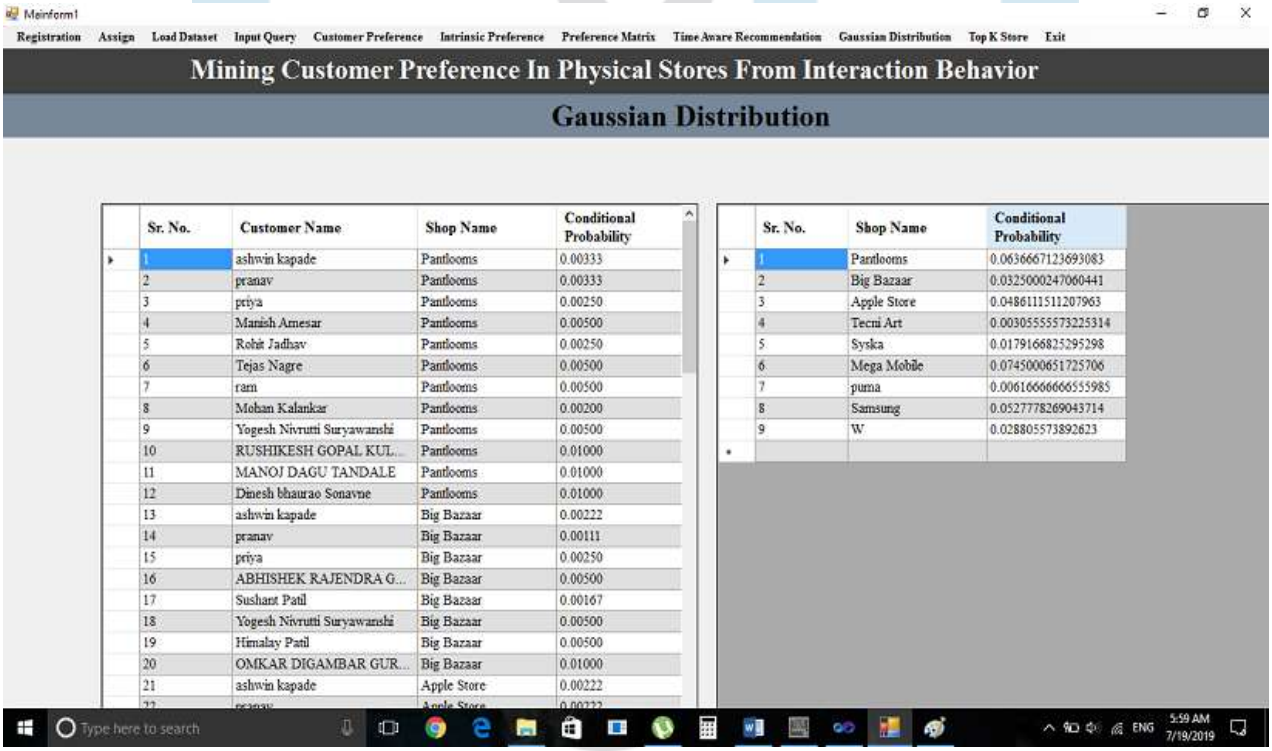
Fig C: Generate preference matrix

preference matrix generates using the date wise entry of the customers that is on some particular date how many customers are visited to shop for the accuracy matrix generation is mostly used.

Sr. No.	Customer Name	Mobile No	Shop Name	Visiting Count	Time
1	priya	9632587412	Pantlooms	3	130
2	priya	9632587412	Big Bazaar	3	60
3	priya	9632587412	Syska	1	45
4	priya	9632587412	Apple Store	2	50
5	priya	9632587412	Mega Mobile	1	60
6	priya	9632587412	Tecni Art	1	15
7	priya	9632587412	W	1	30
8	ashwin kapade	8578965874	Pantlooms	3	115
9	ashwin kapade	8578965874	Big Bazaar	2	50
10	ashwin kapade	8578965874	Apple Store	2	50
11	ashwin kapade	8578965874	Tecni Art	1	15
12	ashwin kapade	8578965874	W	1	30
13	pranav	9874569874	Pantlooms	3	110
14	pranav	9874569874	Big Bazaar	1	20
15	pranav	9874569874	Apple Store	2	50
16	pranav	9874569874	Samsung	1	45
17	pranav	9874569874	Tecni Art	1	15

Fig D: Time aware recommendation

Using time aware recommendation, we can calculate the top- k result of the shops i.e. most visiting count. Here uniqueness is contact numbers. If we put top-k value =7 then result will get show the top 7 stores from the total stores in short, we will get the most popular stores that customers are always want to visit for shopping.



Sr. No.	Customer Name	Shop Name	Conditional Probability
1	ashwin kapade	Pantlooms	0.00333
2	pranav	Pantlooms	0.00333
3	priya	Pantlooms	0.00250
4	Manish Amesar	Pantlooms	0.00500
5	Rohit Jadhav	Pantlooms	0.00250
6	Tejas Nagre	Pantlooms	0.00500
7	ram	Pantlooms	0.00500
8	Mohan Kalankar	Pantlooms	0.00200
9	Yogesh Nivrutti Suryawanshi	Pantlooms	0.00500
10	RUSHIKESH GOPAL KUL...	Pantlooms	0.01000
11	MANOJ DAGU TANDALE	Pantlooms	0.01000
12	Dinesh bhaurao Sonavne	Pantlooms	0.01000
13	ashwin kapade	Big Bazaar	0.00222
14	pranav	Big Bazaar	0.00111
15	priya	Big Bazaar	0.00250
16	ABHISHEK RAJENDRA G...	Big Bazaar	0.00500
17	Sushant Patil	Big Bazaar	0.00167
18	Yogesh Nivrutti Suryawanshi	Big Bazaar	0.00500
19	Himalay Patil	Big Bazaar	0.00500
20	OMKAR DIGAMBAR GUR...	Big Bazaar	0.01000
21	ashwin kapade	Apple Store	0.00222

Sr. No.	Shop Name	Conditional Probability
1	Pantlooms	0.0636667123693083
2	Big Bazaar	0.0325000247060441
3	Apple Store	0.0486111511207963
4	Tecni Art	0.00305555573225314
5	Syska	0.0179166825295298
6	Mega Mobile	0.0745000651725706
7	puma	0.00616666666555985
8	Samsung	0.0527778269043714
9	W	0.028805573892623

Fig E: Gaussian distribution:

Using Gaussian distribution, we calculate the conditional probability in between two customers and every shop and using that we get top-k result. And it is denoting as a N (0,1) it is summarized probability structure.

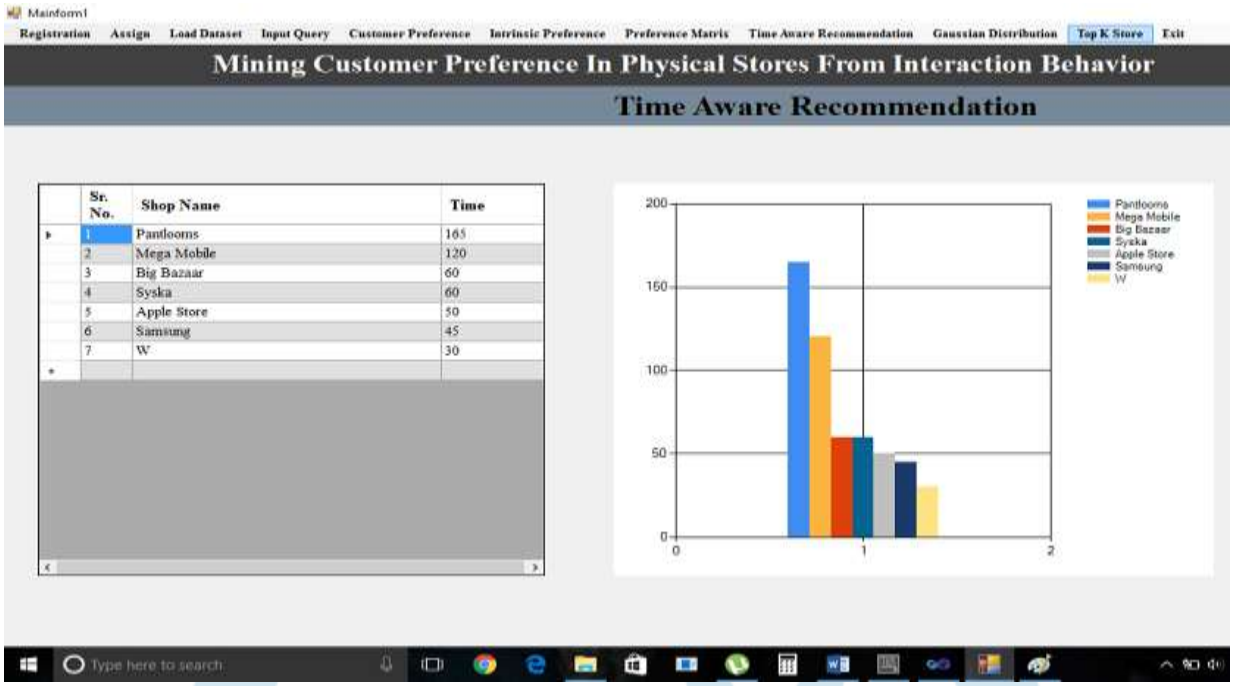


Fig. F: Result:

Shows the top –k recommendation result graphically in that y-axis represent the time and x- axis represent the number of stores. Result is come using the time factor. E.g. how many time customers are visited in the store and from that when any customer wants to visit the store he will see the previous history of the data.

V. CONCLUSION

It is known that customers mostly prefer the online shopping behavior. Using shopping behavior, we can extract the customer's ideas thoughts about the purchasing of products sometimes all this data goes into huge format so optimize customer preferences is important. Using store type recommendation system, we proposed the most efficient methods.

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